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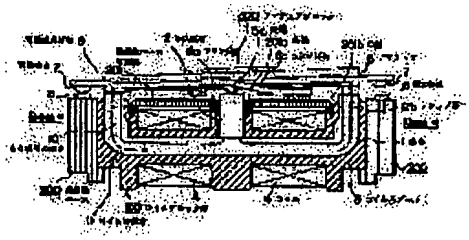
(54) POLAR ELECTROMAGNETIC RELAY

(57)Abstract:
PROBLEM TO BE SOLVED: To improve the insulating property between a coil and respective parts and provide a polar electromagnetic relay with miniaturized size having high breakdown voltage and low electric consumption by forming a gap or a recessed part in a flange part of a coil spool and forming a projected part in a shielding part on the opposite to the gap of the recessed part.
SOLUTION: A flange part 12a into which a permanent magnet 2 is inserted is formed to have a tapered structure and the magnet 2 is of an insulator coil spool 3 unitedly formed as to cover a U-shaped iron core 1. A projected part 201a is formed in a shielding part 201 which electrically insulates the magnet 2 on the opposite to the recessed part and a coil 4. Consequently, the distance along the faces of the coil 4 and the magnet 2 becomes long. Moreover, recessed parts are formed in flange parts 12b in both poles of the iron core 1 and projected parts 201b are formed in the shielding part 201 on the opposite to the recessed parts. As a result, the distance along the faces of the coil 4 and the iron core 1 can be extended. The withstand voltage between the coil 4 and contact points 7, 8 can be heightened.



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* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] An iron core with the character type cross section of KO, the coil wound around the surroundings of this iron core, and the permanent magnet of the shape of a rectangular parallelepiped which fixed the end to the flat surface of the center section of said iron core, With the seesaw mold amateur who consists of tabular magnetic material arranged so that the two poles on which a self center section is supported by the top face of this permanent magnet, and said iron core counters both ends may be contacted In the owner pole type electromagnetic relay which consists of a traveling contact spring which is supported by this seesaw mold amateur's both sides, and has a traveling contact to both ends, and a stationary contact arranged in the location where this traveling contact counters It has the covered section which consists of an insulator between said coil, said seesaw mold amateur, and said traveling contact spring. The coil spool which consists of an insulator really fabricated so that an iron core with the character type cross section of said KO might be covered, The flange which inserts said permanent magnet has the crevice of a taper configuration, and heights are prepared in said covered section which insulates a coil with a permanent magnet electrically so that this crevice may be countered. And the owner pole type electromagnetic relay characterized by preparing heights in said covered section which insulates an iron core and a coil so that a crevice may be formed in the flange of the two poles of said iron core and this crevice may be countered.
[Claim 2] The owner pole type electromagnetic relay according to claim 1 characterized by having established the opening between said permanent magnets in said permanent magnet of said coil spool, and the flange which counters, having prepared heights in said covered section which insulates a permanent magnet and a coil so that this opening section might be countered, and preparing heights in said covered section which insulates an iron core and a coil so that the opening section may be formed in the flange of the two poles of said iron core and this opening section may be countered.
[Claim 3] The owner pole type electromagnetic relay according to claim 1 characterized by having prepared taper structure in said permanent magnet of said coil spool, the flange which counters, and this base electric shielding section that counters this flange, having been filled up with the insulating resin encapsulant for insulating said permanent magnet and said coil to the opening of this flange and this covered section, and making it harden at an elevated temperature.

[Claim 4] The owner pole type electromagnetic relay according to claim 1, 2, or 3 which said covered section contains said coil spool inside, and is characterized by being some insulator

bases to fix.

[Translation done.]

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention] Especially this invention relates to an owner pole type electromagnetic relay with a seesaw balance amateur mold magnetic circuit about an electromagnetic relay.
[0001]
[Description of the Prior Art] Drawing 7 is the sectional view showing the structure of the conventional owner pole type electromagnetic relay. First, the coil 4 which makes the coil spool 3 which consists of a really fabricated insulator generate the magnetomotive force of a relay is rolled so that the iron core 1 with the cross section of the typeface of KO may be covered, the rectangular parallelepiped-like permanent magnet 2 is fixed to flange 12a which inserts the permanent magnet 2 prepared in the flat surface of the center section of the above-mentioned iron core 1, and the coil block object 100 is constituted. Next, the above-mentioned coil block object 100 is inserted in the insulator base 200 of the cube type with which the bottom opened the fixed-end child, neutral terminal, and coil derivation terminal which fixed the stationary contact 8, and this insulator base 200 from the bottom, and it fits into them. After fitting in the insulator base 200 and the above-mentioned coil block object 100, amateur Brock 300 who really fabricated the traveling contact spring 6 equipped with a traveling contact 7 and hinge spring section 6a with the insulator is stationed so that projection 5a of this amateur's 5 self center section may come to the center section of the above-mentioned permanent magnet 2, and both ends may contact further the two poles on which said iron core 1 counters. Stationed amateur Brock 300 is fixed by the approaches of hinge spring 6a and a neutral terminal, such as welding. The covered section 201 has secured the electric insulation with a coil 4, and a traveling contact 7, the traveling contact spring 6, amateur 5, a permanent magnet 2 and an iron core 1 while the insulator base 200 contains and fixes the coil block object 100 to the interior.
[0002] Next, drawing 7 explains the principle of operation of the conventional owner pole type electromagnetic relay. The continuous-line arrow head of drawing 7 expresses the magnetic flux 10 in the deenergisation condition of a coil 4 produced from a permanent magnet 2. In the condition that a coil 4 is not excited, amateur 5 is attracted at the magnetic pole section by the side of a break (Break) (normally-closing side), and is in contact with the stationary contact 8 which the traveling contact 7 by the side of a break counters with the bending force of hinge spring section 6a connected with the traveling contact spring 6. At this time, the magnetic flux 10 generated from a permanent magnet 2 flows to a permanent magnet 2 mainly through the amateur 5 by the side of a break, and an iron core 1. If excitation power is impressed so that the magnetic flux 10 of a permanent magnet 2 may be negated in the coil section 4 of this magnetic circuit, with a coil, the magnetic flux 11 produced in the character type iron core 1 of KO negates magnetic flux 10, and further, when magnetic flux 11 overcomes, an iron core 1 will be tilted focusing on supporting-point 5a, and will be reversed to the Make side (normally open

side).
[0003] In the conventional owner pole type electromagnetic relay shown in this drawing 7 , the coil 4 by the side of primary, the contact 7 of a secondary, and the insulating property between eight are decided by the creeping distance of coil 4 edge, permanent magnet 2, or coil 4 edge and an iron core 1, and an insulating property becomes better [what has the longer creeping distance]. The creeping distance (distance for insulation) of this permanent magnet 2 and iron core 1, and coil 4 serves as the shortest by opening in the both ends of the insulator base 200, and is decided by the configuration of the target coil spool 3, and the configuration of the insulator base 200.
[0004] By general electromagnetic relays other than a seesaw balance mold, the approach of the whole coil being covered with a secondary Plastic solid, the level difference section being prepared, it fitting in, and fused junction being carried out to the part of the flange of this secondary Plastic solid after that, and securing insulation is indicated as the coil insulation approach like publication of unexamined utility model application Heisei 2-5852 or publication of unexamined utility model application Heisei 3-13703 to raise a coil 4, a contact 7, and the insulating withstand voltage between eight.
[0005] Moreover, in the example of publication of unexamined utility model application Showa 62-142141 or publication of unexamined utility model application Heisei 4-33244, the space part between a coil and a contact is covered with coil covering of an insulator, and the approach of raising insulation is indicated.
[0006] Furthermore, in JP,62-14839,A, the whole coil is covered with insulator resin and the approach which is going to enlarge the creeping distance is indicated.
[0007] As an owner pole type electromagnetic relay with seesaw balance mold amateur structure, although shown in JP,57-15327,A, it is a different configuration in that the path of insertion to the base of a coil block object is not shown, and the covered section does not exist between a coil and a contact, for example.
[0008]
[Problem(s) to be Solved by the Invention] It is necessary to raise coil resistance, and in order to lower power consumption, in an owner pole type electromagnetic relay with seesaw balance mold amateur structure, it is necessary to increase the number of coiling and to increase the coil volume for that purpose. If the coil volume is increased, between a coil and a contact, the creeping distance between a coil, a permanent magnet, an iron core, and amateur will specifically become short, and the insulating withstand voltage between the coil by the side of primary and the contact of a secondary will fall. Moreover, as well as the above when it miniaturizes an owner pole type electromagnetic relay, the creeping distance between a coil, a permanent magnet, an iron core, and amateur becomes short, and there is a problem that the insulating withstand voltage between coil-contacts falls similarly.
[0009] the purpose of this invention -- a coil, a permanent magnet, an iron core, and the insulating property between amateur -- improving -- small and a low power — it is — more — high — it is in offering an owner pole type electromagnetic relay [****].
[0010]
[Means for Solving the Problem] The owner pole type electromagnetic relay concerning this invention has the following descriptions.
(1) An iron core with the character type cross section of KO, and the coil wound around the surroundings of this iron core, With the seesaw mold amateur who consists of tabular magnetic material arranged so that the two poles on which a self center section is supported by the top face of the permanent magnet of the shape of a rectangular parallelepiped which fixed the end to the flat surface of the center section of said iron core, and this permanent magnet, and said iron core counters both ends may be contacted In the owner pole type electromagnetic relay which consists of a traveling contact spring which is supported by this seesaw mold amateur's both sides, and has a traveling contact to both ends, and a stationary contact arranged in the location where this traveling contact counters It has the covered section which consists of an insulator between said coil, said seesaw mold amateur, and said traveling contact spring. The coil spool which consists of an insulator really fabricated so that an iron core with the character type

cross section of said KO might be covered, The flange which inserts said permanent magnet has the crevice of a taper configuration, and heights are prepared in said covered section which insulates a coil with a permanent magnet electrically so that this crevice may be countered. And a crevice is formed in the flange of the two poles of said iron core, and it is characterized by preparing heights in said covered section which insulates an iron core and a coil so that this crevice may be countered.
In an owner pole type electromagnetic relay given [said] in 1 term (2) Said coil spool, The opening between said permanent magnets is established in said permanent magnet and the flange which counters. Heights are prepared in said covered section which insulates a permanent magnet and a coil so that this opening section may be countered, and the opening section is formed in the flange of the two poles of said iron core, and it is characterized by preparing heights in said covered section which insulates an iron core and a coil so that this opening section may be countered.
(3) In an owner pole type electromagnetic relay given [said] in 1 term, taper structure is prepared in said permanent magnet of said coil spool, the flange which counters, and this base electric shielding section that counters this flange, and it is filled up with the insulating resin encapsulant for insulating said permanent magnet and said coil to the opening of this flange and this covered section, and is characterized by making it harden at an elevated temperature.
(4) In an owner pole type electromagnetic relay said 1 and 2, and given in 3 terms, said covered section contains said coil spool inside, and is characterized by being some insulator bases to fix.
[0011]
[Embodiment of the Invention] Next, the example of an operation gestalt of this invention is explained with reference to a drawing.
(Example 1 of an operation gestalt) Drawing 1 is the sectional view showing the 1st example of an operation gestalt of the owner pole type electromagnetic relay of this invention. First, a coil 4 is wound around the coil spool 3 which consists of an iron core 1 with the cross section of the typeface of KO, and a really fabricated insulator, the rectangular parallelepiped-like permanent magnet 2 is fixed to the center section of the above-mentioned iron core 1, and the coil block object 100 is constituted. Next, it buries at the insulator base 200 of the cube type with which the bottom opened the fixed-end child, neutral terminal, and coil derivation terminal which fixed the stationary contact 8, and the above-mentioned coil block object 100 is inserted in this insulator base 200 from the bottom, and it fits into it. After this, amateur Brock 300 having the traveling contact spring 6 containing a traveling contact 7 and hinge spring section 6a is stationed so that the two poles on which said iron core 1 counters both ends further in projection 5a of this amateur's 5 self center section at the center section of the permanent magnet 2 may be contacted, hinge spring section 6a and a neutral terminal are fixed by welding, and an owner pole type electromagnetic relay is constituted.
[0012] About the principle of operation of an owner pole type electromagnetic relay, since it is the same as the conventional example of drawing 7 , explanation is omitted here.
[0013] In drawing 1 , a different point from drawing 7 is the following.
[0014] By the relay which lowered power consumption, as shown in drawing 1 , since the volume of a coil 4 increases, the creeping distance between a coil 4, a permanent magnet 2, an iron core 1, and amateur 5 becomes short, and the coil 4 by the side of primary, the contact 7 of a secondary, and the insulating withstand voltage between eight fall. Then, first, in order to lengthen the creeping distance between a coil 4 and a permanent magnet 2, flange 12a which inserts the permanent magnet 2 of the really fabricated insulator coil spool 3 was made into taper structure so that the character type iron core 1 of KO might be covered, and heights 201a is prepared in the base electric shielding section 201 which insulates a coil 4 with the permanent magnet 2 which counters this crevice electrically. Thereby, the creeping distance between a coil 4 and a permanent magnet 2 is long with 26 units in this example of an operation gestalt, if the former is made into 21 units. Moreover, in order to lengthen the creeping distance between a coil 4 and an iron core 1, the crevice was formed in flange 12b of the two poles of an iron core 1, and heights 201b is prepared in the base electric shielding section 201 which counters this crevice. Thereby, the creeping distance between a coil 4 and an iron core 1 is long with 25 units in this

example, if the former is made into 15 units. Consequently, a coil 4, a contact 7, and the insulating withstand voltage between eight improve, as shown in drawing 2 .
(Example 2 of an operation gestalt) Drawing 3 is the sectional view showing the 2nd example of an operation gestalt of the owner pole type electromagnetic relay of this invention. In drawing 3 , the same sign is given to the same member as drawing 1 , and explanation is omitted here. In the 2nd example of an operation gestalt, as shown in drawing 3 , in order to lengthen the creeping distance between a coil 4 and a permanent magnet 2, the opening between permanent magnets 2 was established in the permanent magnet 2 of the coil spool 3, and flange 12a which counters, and heights 201a is provided in the base electric shielding section 201 which counters this opening section. Thereby, the creeping distance between a coil 4 and a permanent magnet 2 is long with 29 units in this example of an operation gestalt, if the former is made into 21 units. Moreover, in order to lengthen the creeping distance between a coil 4 and an iron core 1, the opening section was formed in flange 12b of the two poles of an iron core 1, and heights 201b is prepared in the base electric shielding section 201 which counters this opening section. Thereby, the creeping distance between a coil 4 and an iron core 1 is long with 32 units in this example of an operation gestalt, if the former is made into 15 units. Consequently, a coil 4, a contact 7, and the insulating withstand voltage between eight improve, as shown in drawing 4 .
(Example 3 of an operation gestalt) Drawing 5 is the sectional view showing the 3rd example of an operation gestalt of the owner pole type electromagnetic relay of this invention. In drawing 5 , the same sign is given to the same member as drawing 1 , and explanation is omitted here. As shown in drawing 5 , in order to lengthen the creeping distance between a coil 4 and a permanent magnet 2 in the 3rd example of an operation gestalt, Taper structure is prepared in the base electric shielding section 201 which counters the permanent magnet 2 of the coil spool 3, flange 12a which counters, and its flange 12a. The opening of this flange 12a and the base electric shielding section 201 is filled up with the insulating resin encapsulant 13 for insulating a coil 4 with a permanent magnet 2, and is stiffened at the elevated temperature around 100 degrees C. Thereby, if the creeping distance between a coil 4 and a permanent magnet 2 makes the former 21 units, in this example, it becomes long with 26 units, consequently a coil 4, a contact 7, and the insulating withstand voltage between eight improve, as shown in drawing 6 .
[0015]
[Effect of the Invention] As explained above, the owner pole type electromagnetic relay of this invention A taper or an opening is established in flange 12a which inserts the permanent magnet 2 of the insulator coil spool 3. Heights 201a was prepared in the base electric shielding section 201 which counters this crevice, and heights 201b was prepared in the base electric shielding section 201 which forms a crevice or an opening in flange 12b of the two poles of an iron core 1, and counters this crevice, Furthermore, the permanent magnet 2 of the coil spool 3 and flange 12a which counters, By having prepared taper structure in the base electric shielding section 201 which counters that flange 12a, and having made the opening of this flange 12a and the base electric shielding section 201 fill up with and harden the insulating resin encapsulant 13 the creeping distance between a coil 4, a permanent magnet 2, an iron core 1, and amateur 5 — long — it can carry out -- consequently, a coil 4, a contact 7, and the insulating withstand voltage between eight -- increasing — small and a low power -- more -- high -- an owner pole type electromagnetic relay [****] can be offered.

[Translation done.]

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3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The structure section Fig. of an owner pole type electromagnetic relay showing the 1st example of an operation gestalt of this invention.
[Drawing 2] The insulating withstand voltage Fig. of an owner pole type electromagnetic relay showing the 1st example of an operation gestalt of this invention.
[Drawing 3] The structure section Fig. of an owner pole type electromagnetic relay showing the 2nd example of an operation gestalt of this invention.
[Drawing 4] The insulating withstand voltage Fig. of an owner pole type electromagnetic relay showing the 2nd example of an operation gestalt of this invention.
[Drawing 5] The structure section Fig. of an owner pole type electromagnetic relay showing the 3rd example of an operation gestalt of this invention.
[Drawing 6] The insulating withstand voltage Fig. of an owner pole type electromagnetic relay showing the 3rd example of an operation gestalt of this invention.
[Drawing 7] The structure section Fig. of an owner pole type electromagnetic relay showing a conventional example.
[Drawing 8] The insulating withstand voltage Fig. of an owner pole type electromagnetic relay showing a conventional example.
[Description of Notations]
1 Iron Core
2 Permanent Magnet
3 Coil Spool
4 Coil
5 Amateur
6 Traveling Contact Spring
6a Hinge spring
7 Traveling Contact
8 Stationary Contact
10 Permanent Magnet Magnetic Flux
11 Coil Magnetic Flux
12a Permanent magnet side flange
12b Iron core side flange
13 Insulating Resin Encapsulant
100 Coil Block Object
200 Insulator Base
201 Insulator Base Electric Shielding Section
201a Permanent magnet side heights
201b Iron core side heights
300 Amateur Brock

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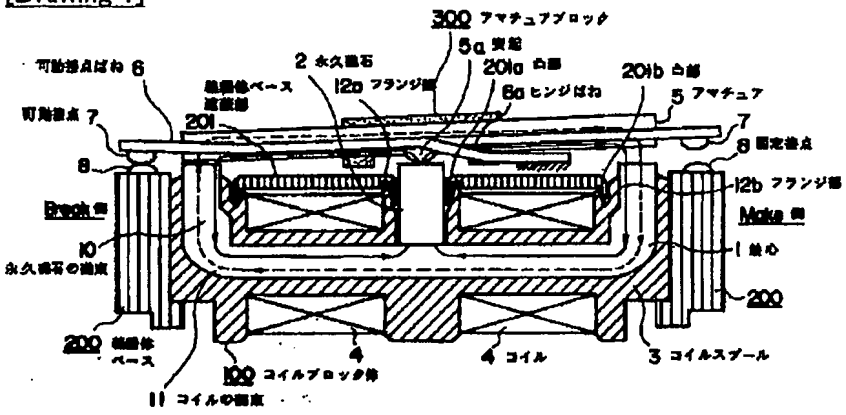
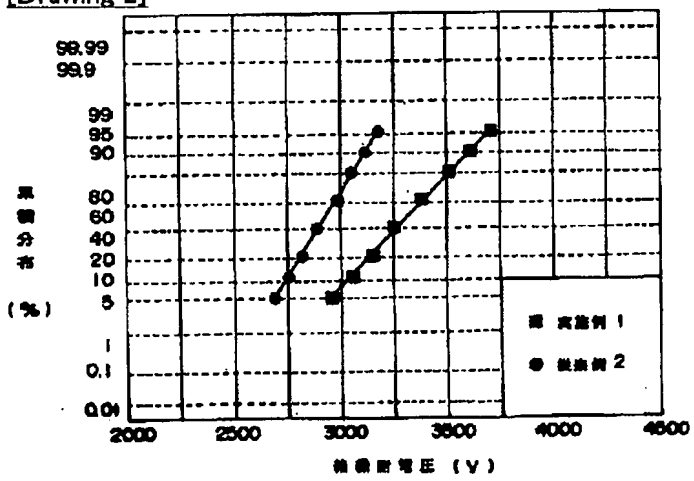
DRAWINGS

[Drawing 1]



[Drawing 2]



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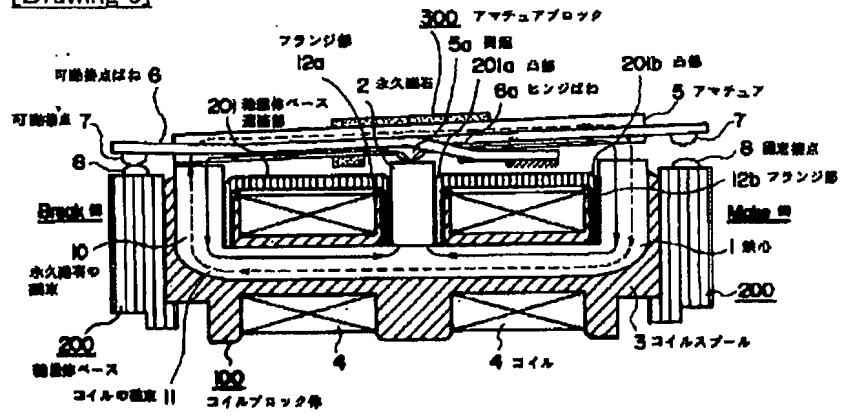

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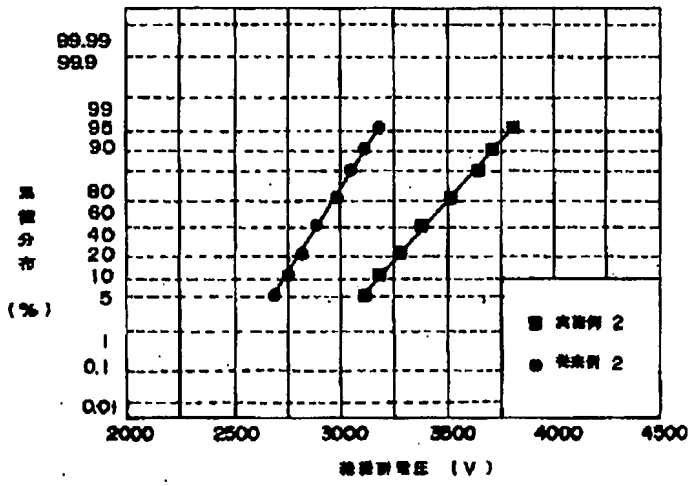

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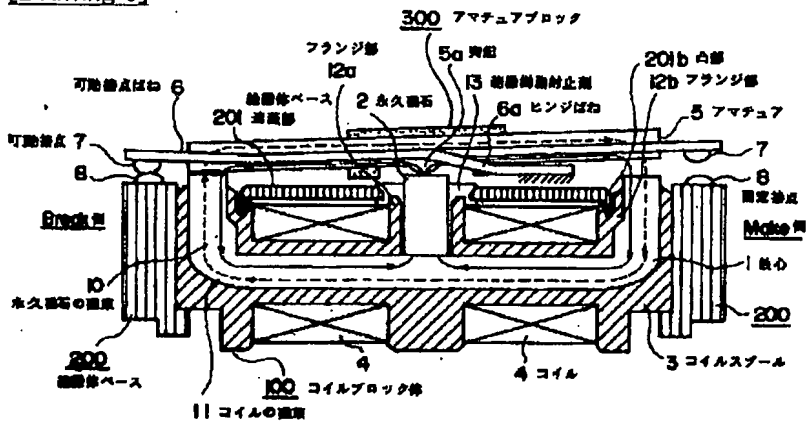
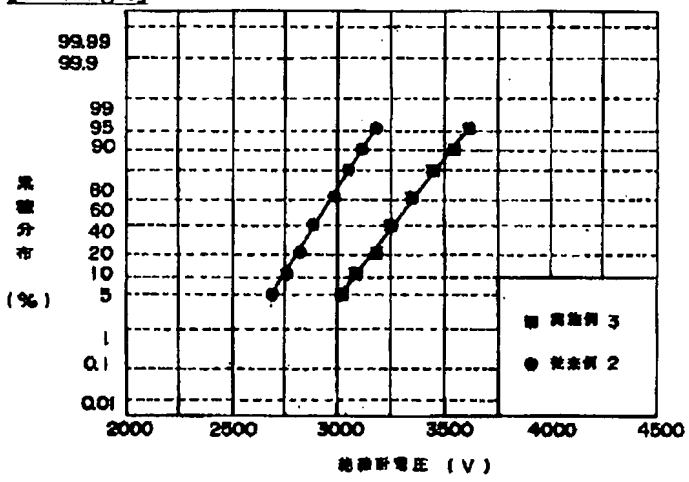
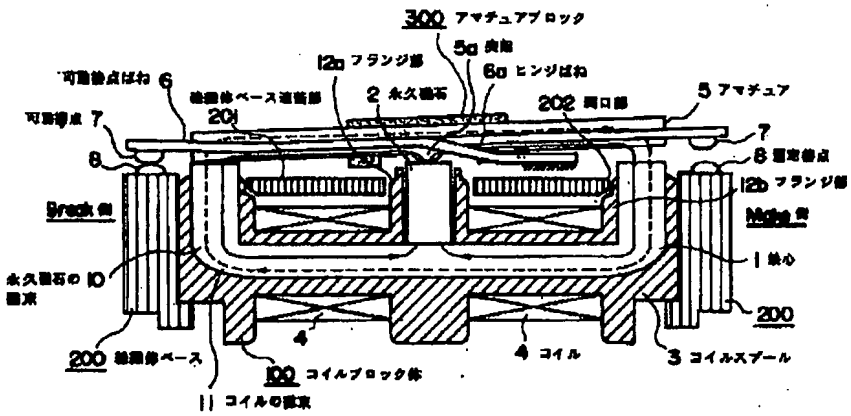


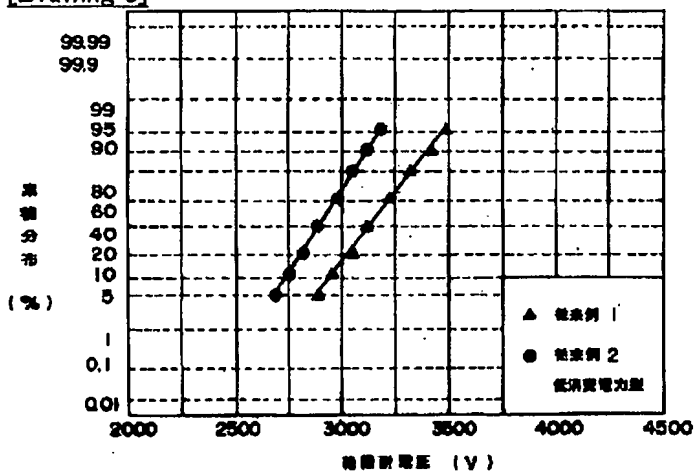
[Drawing 6]



[Drawing 7]



[Drawing 8]



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最終頁に続く

(54)【発明の名称】　有極型電磁リレー

(57)【要約】

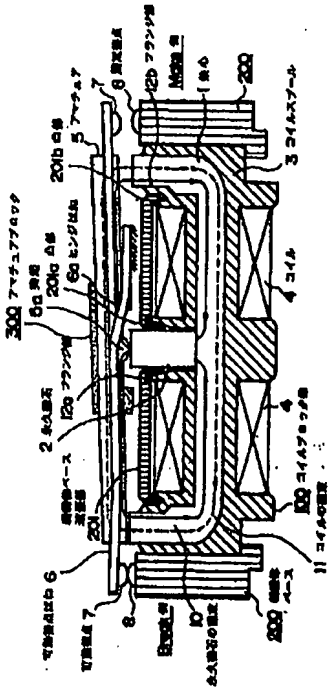
【課題】　本発明の目的は、コイルと永久磁石、鉄心、アマチュア間の絶縁特性を改善し、小形かつ低消費電力で、より高耐圧な有極型電磁リレーを提供することにある。

【解決手段】　本発明の有極型電磁リレーは、以下の３つの構成により、コイルと永久磁石、鉄心、およびアマチュア間の沿面距離を長くしている。

（１）スプールの永久磁石側のフランジ部にテーパー構造を設け、かつ、鉄心の両極のフランジ部に凹部を形成し、この両部に対向するベース遮蔽部に凸部を設けた。

（２）スプールの永久磁石側のフランジ部に空隙部を設け、かつ、鉄心の両極のフランジ部に空隙部を形成し、この両空隙部に対向するベース遮蔽部に凸部を設けた。

（３）スプールの永久磁石側のフランジ部と、そのフランジ部に対向するベース遮蔽部にテーパー構造を設け、そのテーパー部の空隙に、絶縁樹脂封止剤を充填し、高温で硬化させた。



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【特許請求の範囲】

【請求項１】　コの字型の断面を持つ鉄心と、該鉄心の回りに巻いたコイルと、前記鉄心の中央部の平面に一端を固定した直方体状の永久磁石と、該永久磁石の上面に自己の中央部を支持され、両端を前記鉄心の対向する両極に当接するよう配置された板状の磁性材からなるシーソー型アマチュアと、該シーソー型アマチュアの両側に支持され、かつ両端に可動接点を有する可動接点ばねと、該可動接点の対向する位置に配置された固定接点とからなる有極型電磁リレーにおいて、前記コイルと前記シーソー型アマチュアおよび前記可動接点ばねとの間に絶縁体からなる遮蔽部を備え、前記コの字型の断面を持つ鉄心を覆うように一体成形された絶縁体からなるコイルスプールの、前記永久磁石を挿入するフランジ部がテーパー形状の凹部を持ち、この凹部に対向するよう永久磁石とコイルを電気的に絶縁する前記遮蔽部に凸部を設け、かつ、前記鉄心の両極のフランジ部に凹部を形成し、この凹部に対向するよう鉄心とコイルを絶縁する前記遮蔽部に凸部を設けたことを特徴とする有極型電磁リレー。

【請求項２】　前記コイルスプールの、前記永久磁石と対向するフランジ部に前記永久磁石との間の空隙を設け、該空隙部に対向するよう永久磁石とコイルとを絶縁する前記遮蔽部に凸部を設け、かつ、前記鉄心の両極のフランジ部に空隙部を形成し、該空隙部に対向するよう鉄心とコイルを絶縁する前記遮蔽部に凸部を設けたことを特徴とする請求項１記載の有極型電磁リレー。

【請求項３】　前記コイルスプールの、前記永久磁石と対向するフランジ部と、該フランジ部に対向する該ベース遮蔽部にテーパー構造を設け、該フランジ部と該遮蔽部との空隙に、前記永久磁石と前記コイルを絶縁するための絶縁樹脂封止剤を充填し、高温で硬化させたことを特徴とする請求項１記載の有極型電磁リレー。

【請求項４】　前記遮蔽部が前記コイルスプールを内部に収納し、固定する絶縁体ベースの一部であることを特徴とする請求項１、２または３記載の有極型電磁リレー。

【発明の詳細な説明】

【発明の属する技術分野】本発明は、電磁リレーに関し、特にシーソーバランスアマチュア型磁気回路を持つ有極型電磁リレーに関する。

【０００１】

【従来の技術】図７は、従来の有極型電磁リレーの構造を示す断面図である。まず、コの字形の断面を持つ鉄心１を覆うように一体成形された絶縁体からなるコイルスプール３に、リレーの起磁力を発生させるコイル４を巻き、上記鉄心１の中央部の平面に設けられた永久磁石２を挿入するフランジ部１２ａに直方体状の永久磁石２を固定してコイルブロック体１００を構成する。次に、固定接点８を固着した固定端子、中立端子およびコイル導

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出端子を下側が開いた箱形の絶縁体ベース２００、この絶縁体ベース２００に上記コイルブロック体１００を下側から挿入し、嵌合する。絶縁体ベース２００と上記コイルブロック体１００を嵌合したのち、可動接点７およびヒンジばね部６ａを備えた可動接点ばね６を絶縁体によって一体成形したアマチュアブロック３００を、このアマチュア５の自己の中央部の突起５ａが上記永久磁石２の中央部に来るように、さらに、両端が前記鉄心１の対向する両極に当接するように配置する。配置されたアマチュアブロック３００は、ヒンジばね６ａと中立端子との溶接などの方法により固定される。絶縁体ベース２００は、コイルブロック体１００を内部に収納、固定すると共に、遮蔽部２０１は、コイル４と、可動接点７、可動接点ばね６、アマチュア５、永久磁石２、および、鉄心１との電気的な絶縁を確保している。

【０００２】次に、従来の有極型電磁リレーの動作原理を図７により説明する。図７の実線矢印は、コイル４の無励磁状態における、永久磁石２より生ずる磁束１０を表している。コイル４が励磁されない状態では、可動接点ばね６に連結されたヒンジばね部６ａの曲げ力により、アマチュア５はブレイク（Ｂｒｅａｋ）側（常閉側）の磁極部に吸引され、ブレイク側の可動接点７が対向する固定接点８に接触している。この時、永久磁石２より発生する磁束１０は、主としてブレイク側のアマチュア５、鉄心１を通って永久磁石２に流れる。この磁気回路のコイル部４に永久磁石２の磁束１０を打ち消すように励磁電力を印加すると、コイルにより、コの字型の鉄心１に生じる磁束１１が磁束１０を打ち消し、さらに、磁束１１が打ち勝ったとき、鉄心１は支点５ａを中心に傾動してＭａｋｅ側（常開側）に反転する。

【０００３】この図７に示す従来の有極型電磁リレーにおいては、１次側のコイル４と２次側の接点７，８間の絶縁特性は、コイル４端部と永久磁石２またはコイル４端部と鉄心１との沿面距離で決まり、沿面距離が長いものほど、絶縁特性が良好となる。この永久磁石２および鉄心１とコイル４との沿面距離（絶縁距離）は、絶縁体ベース２００の両端部における開口部で最短となり、対象となるコイルスプール３の形状および絶縁体ベース２００の形状で決まる。

【０００４】コイル４と接点７，８間の絶縁耐電圧を高めたいとき、シーソーバランス型以外の一般的な電磁リレーでは、コイル絶縁方法として、例えば、実開平２－５８５２や実開平３－１３７０３のように、コイル全体を２次成形体で覆い、この２次成形体のつばの部分に段差部を設けて嵌合し、その後、溶融接合して絶縁性を確保しようとする方法が開示されている。

【０００５】また、実開昭６２－１４２１４１や実開平４－３３２４４の例では、コイルと接点間の空間部分を絶縁体のコイルカバーで覆い、絶縁性を高める方法が開示されている。

【０００６】さらに、特開昭６２－１４８３９では、コイル全体を絶縁体樹脂で被覆し、沿面距離を大きくしようとする方法が開示されている。

【０００７】シーソーバランス型アマチュア構造を持つ有極型電磁リレーとしては、例えば、特開昭５７－１５３２７に示されているが、コイルブロック体のベースへの挿入方向が示されておらず、コイル、接点間に遮蔽部が存在しない点で異なる構成である。

【０００８】

【発明が解決しようとする課題】シーソーバランス型アマチュア構造を持つ有極型電磁リレーにおいて、消費電力を下げるためには、コイル抵抗を上げる必要があり、そのためには、コイル巻き数を増やして、コイル体積を増加する必要がある。コイル体積を増加すると、コイルと接点間、具体的にはコイルと永久磁石、鉄心、およびアマチュア間の沿面距離が短くなり、１次側のコイルと２次側の接点間の絶縁耐電圧が低下する。また、有極型電磁リレーを小形化する場合も、上記と同様に、コイルと永久磁石、鉄心、およびアマチュア間の沿面距離が短くなり、同様にコイル－接点間の絶縁耐電圧が低下するという問題がある。

【０００９】本発明の目的は、コイルと永久磁石、鉄心、およびアマチュア間の絶縁特性を改善し、小形かつ低消費電力で、より高耐圧な有極型電磁リレーを提供することにある。

【００１０】

【課題を解決するための手段】本発明に係わる有極型電磁リレーは、以下の特徴を持つ。

（１）コの字型の断面を持つ鉄心と、該鉄心の回りに巻いたコイルと、前記鉄心の中央部の平面に一端を固定した直方体状の永久磁石と、該永久磁石の上面に自己の中央部を支持され、両端を前記鉄心の対向する両極に当接するよう配置された板状の磁性材からなるシーソー型アマチュアと、該シーソー型アマチュアの両側に支持され、かつ両端に可動接点を有する可動接点ばねと、該可動接点の対向する位置に配置された固定接点とからなる有極型電磁リレーにおいて、前記コイルと前記シーソー型アマチュアおよび前記可動接点ばねとの間に絶縁体からなる遮蔽部を備え、前記コの字型の断面を持つ鉄心を覆うように一体成形された絶縁体からなるコイルスプールの、前記永久磁石を挿入するフランジ部がテーパー形状の凹部を持ち、この凹部に対向するよう永久磁石とコイルを電気的に絶縁する前記遮蔽部に凸部を設け、かつ、前記鉄心の両極のフランジ部に凹部を形成し、この凹部に対向するよう鉄心とコイルを絶縁する前記遮蔽部に凸部を設けたことを特徴とする。

（２）前記１項記載の有極型電磁リレーにおいて、前記コイルスプールの、前記永久磁石と対向するフランジ部に前記永久磁石との間の空隙を設け、該空隙部に対向するよう永久磁石とコイルとを絶縁する前記遮蔽部に凸部を設け、かつ、前記鉄心の両極のフランジ部に空隙部を形成し、該空隙部に対向するよう鉄心とコイルを絶縁する前記遮蔽部に凸部を設けたことを特徴とする。

（３）前記１項記載の有極型電磁リレーにおいて、前記コイルスプールの、前記永久磁石と対向するフランジ部と、該フランジ部に対向する該ベース遮蔽部にテーパー構造を設け、該フランジ部と該遮蔽部との空隙に、前記永久磁石と前記コイルを絶縁するための絶縁樹脂封止剤を充填し、高温で硬化させたことを特徴とする。

（４）前記１、２、３項記載の有極型電磁リレーにおいて、前記遮蔽部が前記コイルスプールを内部に収納し、固定する絶縁体ベースの一部であることを特徴とする。

【００１１】

【発明の実施の形態】次に本発明の実施形態例について、図面を参照して説明する。

（実施形態例１）図１は、本発明の有極型電磁リレーの第１の実施形態例を示す断面図である。まず、コの字形の断面を持つ鉄心１と一体成形された絶縁体からなるコイルスプール３に、コイル４を巻き、上記鉄心１の中央部に直方体状の永久磁石２を固定してコイルブロック体１００を構成する。次に、固定接点８を固着した固定端子、中立端子およびコイル導出端子を下側が開いた箱形の絶縁体ベース２００に埋め、この絶縁体ベース２００に上記コイルブロック体１００を下側から挿入し嵌合する。こののち、可動接点７およびヒンジばね部６ａを含む可動接点ばね６を備えたアマチュアブロック３００を、このアマチュア５の自己の中央部の突起５ａを永久磁石２の中央部に、さらに、両端を前記鉄心１の対向する両極に当接するように配置し、ヒンジばね部６ａと中立端子とを溶接により固定して、有極型電磁リレーを構成する。

【００１２】有極型電磁リレーの動作原理については、図７の従来例と同じため、ここでは説明を省略する。

【００１３】図１において、図７と異なる点は以下である。

【００１４】図１に示すように、消費電力を下げたリレーでは、コイル４の体積が増加するため、コイル４と永久磁石２、鉄心１、およびアマチュア５間の沿面距離が短くなり、１次側のコイル４と２次側の接点７，８間の絶縁耐電圧が低下する。そこで、まず、コイル４と永久磁石２の間の沿面距離を長くするため、コの字型の鉄心１を覆うように一体成形された絶縁体コイルスプール３の、永久磁石２を挿入するフランジ部１２ａをテーパー構造にし、この凹部に対向する永久磁石２とコイル４を電気的に絶縁するベース遮蔽部２０１に凸部２０１ａを設けている。これにより、コイル４と永久磁石２の間の沿面距離は、従来を２１単位とすると、本実施形態例では、２６単位と長くなっている。また、コイル４と鉄心１の間の沿面距離を長くするため、鉄心１の両極のフランジ部１２ｂに凹部を形成し、この凹部に対向するベー

ス遮蔽部２０１に凸部２０１ｂを設けている。これにより、コイル４と鉄心１の間の沿面距離は、従来を１５単位とすると、本例では、２５単位と長くなっている。この結果、コイル４と接点７，８間の絶縁耐電圧は、図２に示すように改善されている。

（実施形態例２）図３は、本発明の有極型電磁リレーの第２の実施形態例を示す断面図である。図３において、図１と同じ部材には同じ符号が付してあり、ここでは説明は省略する。図３に示すように、第２の実施形態例では、コイル４と永久磁石２の間の沿面距離を長くするため、コイルスプール３の、永久磁石２と対向するフランジ部１２ａに永久磁石２との間の空隙を設け、この空隙部に対向するベース遮蔽部２０１に凸部２０１ａを設けている。これにより、コイル４と永久磁石２の間の沿面距離は、従来を２１単位とすると、本実施形態例では、２９単位と長くなっている。また、コイル４と鉄心１の間の沿面距離を長くするため、鉄心１の両極のフランジ部１２ｂに空隙部を形成し、この空隙部に対向するベース遮蔽部２０１に凸部２０１ｂを設けている。これにより、コイル４と鉄心１の間の沿面距離は、従来を１５単位とすると、本実施形態例では、３２単位と長くなっている。この結果、コイル４と接点７，８間の絶縁耐電圧は、図４に示すように改善されている。

（実施形態例３）図５は、本発明の有極型電磁リレーの第３の実施形態例を示す断面図である。図５において、図１と同じ部材には同じ符号が付してあり、ここでは説明は省略する。図５に示すように、第３の実施形態例では、コイル４と永久磁石２の間の沿面距離を長くするため、コイルスプール３の、永久磁石２と対向するフランジ部１２ａと、そのフランジ部１２ａに対向するベース遮蔽部２０１にテーパー構造を設け、このフランジ部１２ａとベース遮蔽部２０１との空隙に、永久磁石２とコイル４を絶縁するための絶縁樹脂封止剤１３を充填し、１００℃前後の高温で硬化させている。これにより、コイル４と永久磁石２の間の沿面距離は、従来を２１単位とすると、本例では、２６単位と長くなり、この結果、コイル４と接点７，８間の絶縁耐電圧は、図６に示すように改善されている。

【００１５】

【発明の効果】以上説明したように、本発明の有極型電磁リレーは、絶縁体コイルスプール３の永久磁石２を挿入するフランジ部１２ａにテーパーまたは空隙を設け、この凹部に対向するベース遮蔽部２０１に凸部２０１ａを設け、かつ、鉄心１の両極のフランジ部１２ｂに凹部または空隙を形成し、この凹部に対向するベース遮蔽部２０１に凸部２０１ｂを設けたことと、さらに、コイルスプール３の永久磁石２と対向するフランジ部１２ａ＊と、そのフランジ部１２ａに対向するベース遮蔽部２０１にテーパー構造を設け、このフランジ部１２ａとベース遮蔽部２０１との空隙に、絶縁樹脂封止剤１３を充填し、硬化させたことにより、コイル４と永久磁石２、鉄心１、およびアマチュア５間の沿面距離を長くすることができ、その結果、コイル４と接点７，８間の絶縁耐電圧を増大し、小形かつ低消費電力で、より高耐圧な有極型電磁リレーを提供することができる。

【図面の簡単な説明】

【図１】本発明の第１の実施形態例を示す有極型電磁リレーの構造断面図。

【図２】本発明の第１の実施形態例を示す有極型電磁リレーの絶縁耐電圧図。

【図３】本発明の第２の実施形態例を示す有極型電磁リレーの構造断面図。

【図４】本発明の第２の実施形態例を示す有極型電磁リレーの絶縁耐電圧図。

【図５】本発明の第３の実施形態例を示す有極型電磁リレーの構造断面図。

【図６】本発明の第３の実施形態例を示す有極型電磁リレーの絶縁耐電圧図。

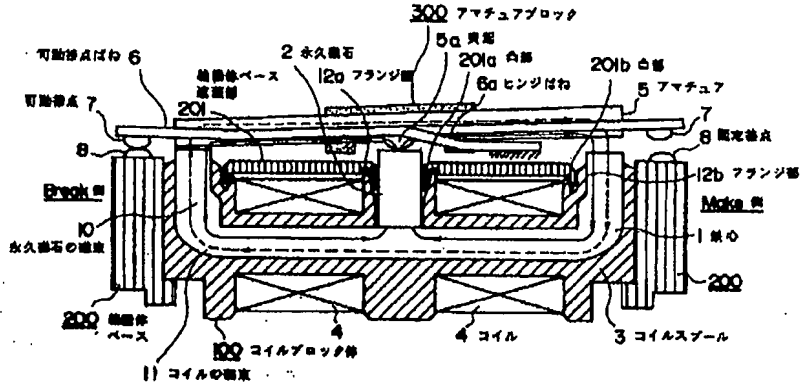
【図７】従来の一例を示す有極型電磁リレーの構造断面図。

【図８】従来の一例を示す有極型電磁リレーの絶縁耐電圧図。

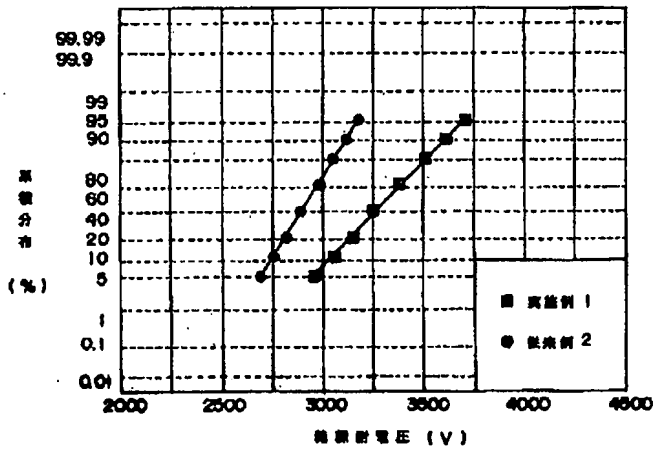
【符号の説明】

１　鉄心
２　永久磁石
３　コイルスプール
４　コイル
５　アマチュア
６　可動接点ばね
６ａ　ヒンジばね
７　可動接点
８　固定接点
１０　永久磁石磁束
１１　コイル磁束
１２ａ　永久磁石側フランジ部
１２ｂ　鉄心側フランジ部
１３　絶縁樹脂封止剤
１００　コイルブロック体
２００　絶縁体ベース
２０１　絶縁体ベース遮蔽部
２０１ａ　永久磁石側凸部
２０１ｂ　鉄心側凸部
３００　アマチュアブロック

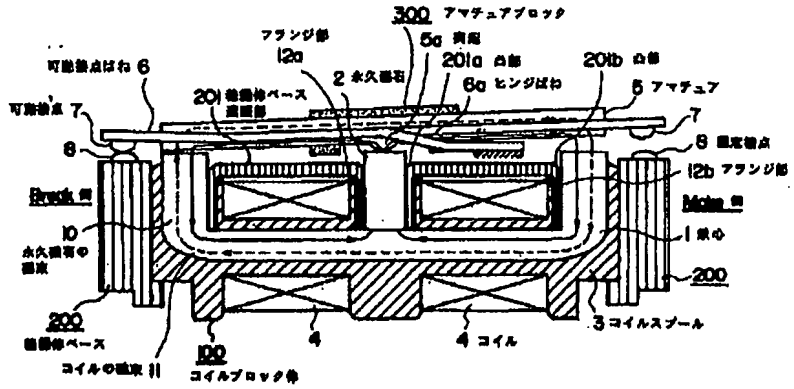
【図1】


300 アマチュアブロック
5a 突起
2 永久磁石
12a フランジ部
20la 凸部
20lb 凸部
6a ヒンジばね
5 アマチュア
可動接点ばね 6
可動接点 7
201
8
8 固定接点
Break 側
12b フランジ部
Make 側
10
永久磁石の磁束
1 鉄心
200
200 磁路体ベース
100 コイルブロック体
4
4 コイル
3 コイルスプール
11 コイルの磁束

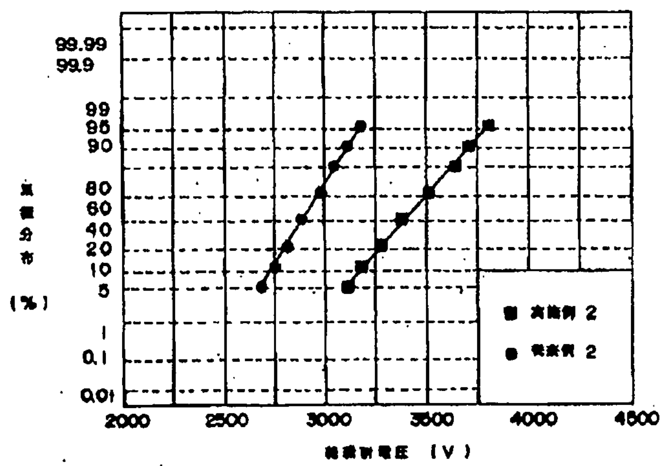
【図2】


99.99
99.9
99
95
90
80
60
40
20
10
5
1
0.1
0.01
累積分布（%）
2000
2500
3000
3500
4000
4500
絶縁耐電圧（V）
実施例 1
比較例 2

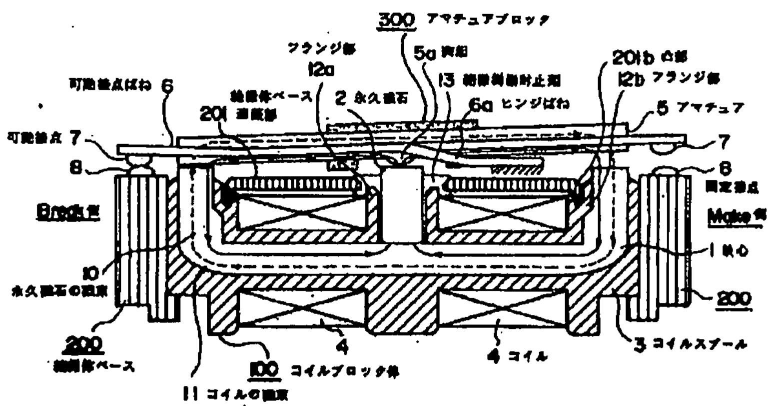
【図3】


300 アマチュアブロック
フランジ部
12a
5a 突起
2 永久磁石
20la 凸部
20lb 凸部
可動接点ばね 6
6a ヒンジばね
5 アマチュア
201 磁路体ベース
可動接点 7
8
8 固定接点
Break 側
12b フランジ部
Make 側
10
永久磁石の磁束
1 鉄心
200
200 磁路体ベース
コイルの磁束 11
100 コイルブロック体
4
4 コイル
3 コイルスプール

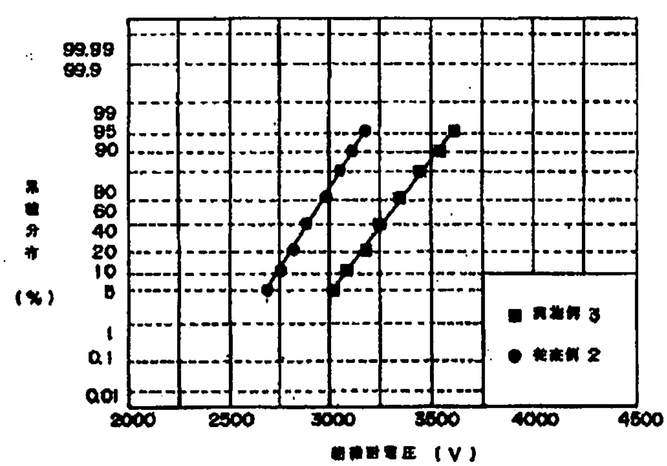
【図４】


99.99
99.9
99
95
90
80
60
40
20
10
5
1
0.1
0.01
(%)
2000
2500
3000
3500
4000
4500
(V)

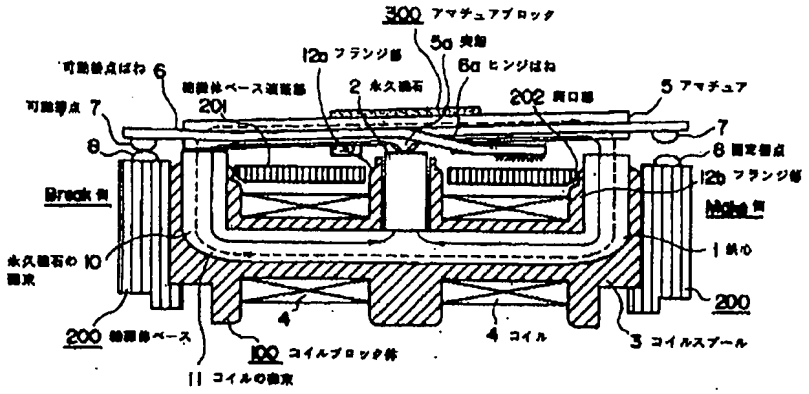
【図５】


300 アマチュアブロック
フランジ部
12a
5a
201b
12b フランジ部
可動接点ばね 6
2 永久磁石
13
6a ヒンジばね
201
5 アマチュア
可動接点 7
7
8
8
固定接点
Break 側
Make 側
1 鉄心
10
200
200
4
4 コイル
3 コイルスプール
100 コイルブロック体
11 コイルの磁束

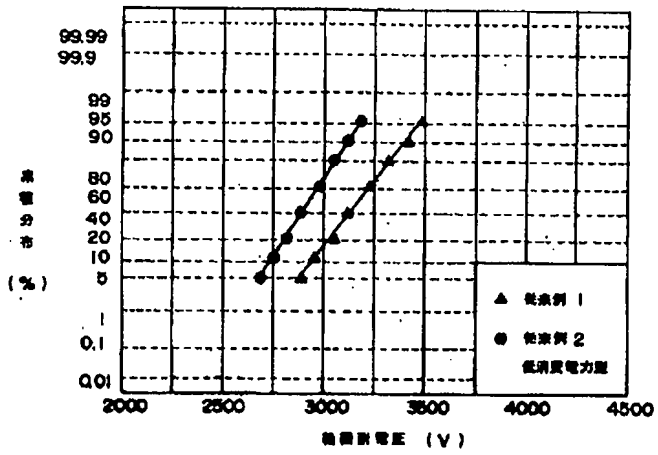
【図６】


99.99
99.9
99
95
90
80
60
40
20
10
5
1
0.1
0.01
(%)
2000
2500
3000
3500
4000
4500
(V)

【図７】



【図８】



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